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# Adding Quality of Service





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# Objectives

- At the end of this session you should have a good understanding of:
  - Security
  - Reliability
  - Transactions
  - Service Level Agreements
    in a Service Oriented Architecture

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# Contents

- WS Security, SecureConversation, Trust
- WS Reliable Messaging
- WS Atomic Transactions

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# Security





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# Securing an SOA

- What challenges does securing an SOA have?
- How do you secure XML?
- How do you manage security across an SOA?

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# SOA security challenges

- A single security model may not be in place across all parties:
  - No single-sign on
  - No federated identity scheme
- There may be regulatory issues with sharing data across organizations
- The overhead of security may be much higher in a distributed environment than in a stovepipe:
  - Encryption, Signature checking, XML validation, Authentication all have overhead

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# Security issues and approaches

- Privacy
  - XML encryption
- Integrity
  - XML Signature
- Authentication
  - User/Pass, Certificates, Tokens
- XML Denial of Service
  - XML Firewalls
- Validity
  - Schema validators

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# Web Services Security

- WSS 1.1, an OASIS standard
  - Provides the key *message* security
  - Encryption
    - confidentiality
  - Digital Signature
    - integrity
  - Authentication
    - identity

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# WSS example

```
<wsse:Security env:mustUnderstand="1">
  <wsse:UsernameToken wsu:Id="UsernameToken-12273995">
    <wsse:Username>paul</wsse:Username>
    <wsse:Password Type="PasswordDigest">
          ML3T45abnJHUDskjja+134=
    </wsse:Password>
    <wsse:Nonce>Z+GDe5PSj6V64fRPZc0PrA==</wsse:Nonce>
    <wsu:Created>2006-05-22T15:48:41.437Z</wsu:Created>
  </wsse:UsernameToken>
</wsse:Security>
```

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# Performance

- WS-Security has a performance overhead:
  - XML Canonicalization (not full)
  - Public key encryption vs private key
- The security is done per message
  - No session

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# WS-SecureConversation

- Sets up a security session between two parties
  - Uses Public Key to agree a private key
  - Once established the session uses private key
  - Very similar model to SSL
  - Under standardisation

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# Security tokens

- Profiles
  - Binary (any)
  - Username/Password
  - SAML (Security Assertion Markup)
  - X.509 certificate
  - Kerberos Token
  - Rights Expression Language Token

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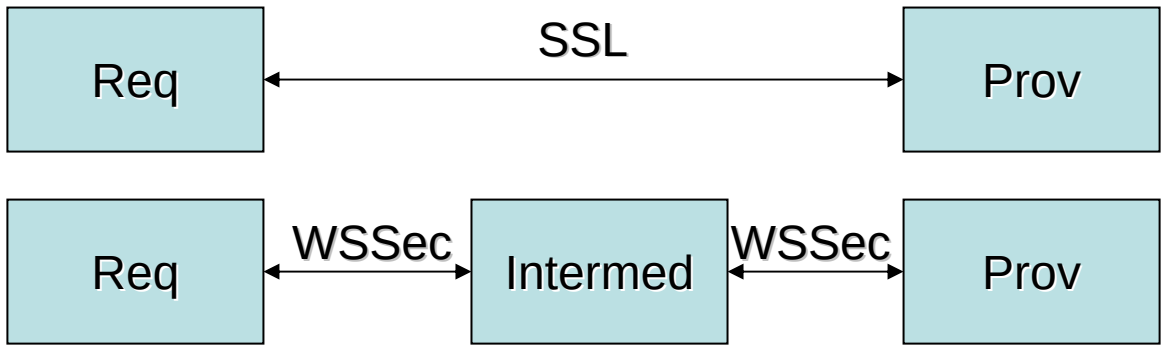
# Plain Ole SSL

- Many systems use SOAP over SSL/TLS
- High performance
- Works fine for single-hop
- Tried, trusted, understood



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# Advanced security

- How do you get a token?
- Typically in an enterprise there is an token infrastructure such as kerberos
- *WS-Trust* provides a model for getting and passing tokens using Web Services
- Being standardized by OASIS
- Important for Federated Security and complex networks

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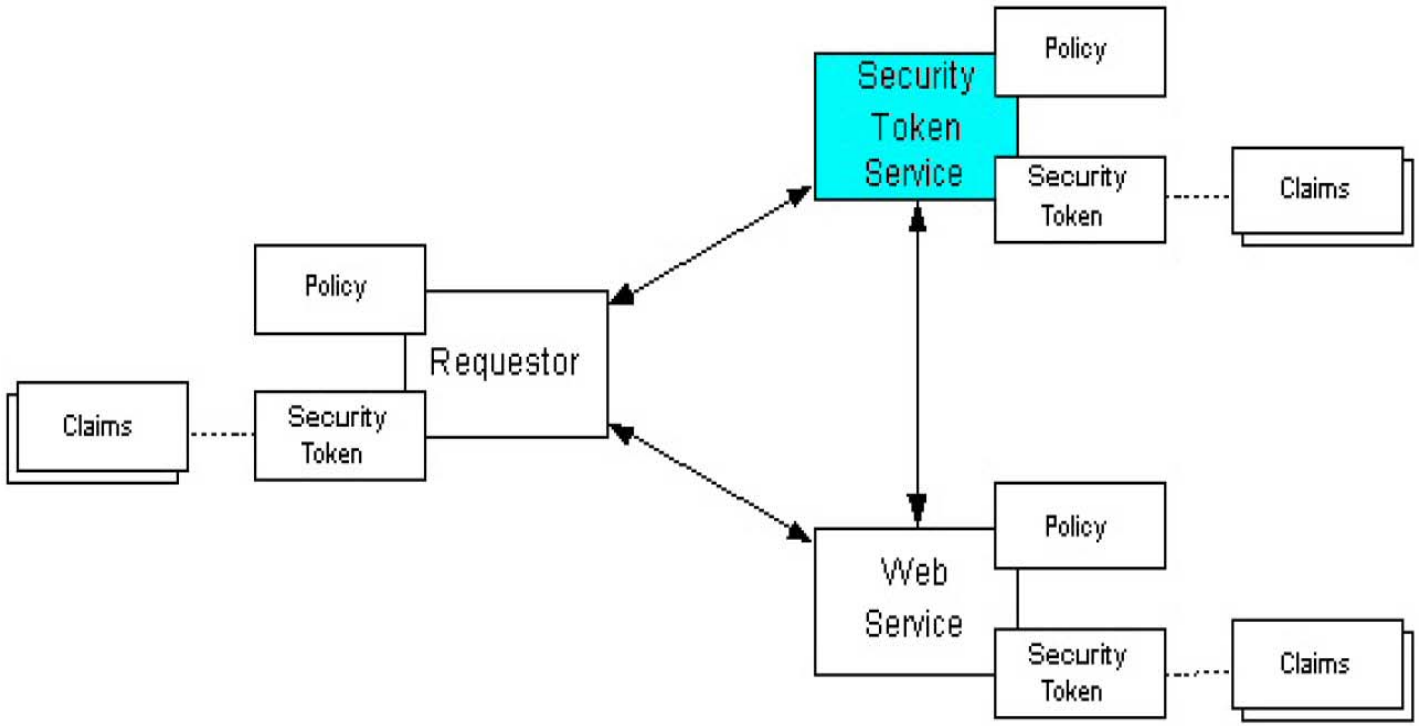
# WS-Trust model



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# Further security issues

- Services need to be designed with security in mind
  - The architecture and approach are powerful
  - Correspondingly need care
- Composing security and other aspects can be difficult
  - For example:
    - Who is allowed to ack received messages?
    - Who is allowed to commit a transaction
    - Does the same security session remain in place for the duration of a sequence?

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# Reliable delivery






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# Reliability

- Request Response gives some reliability
  - You know when it worked
  - But when it fails, was it the request or the response that was lost
- One approach is "idempotence"
  - ["Same effect if done n times, n>0"]
  - Keep repeating until I get a response
  - Each message must be replayable
  - Often requires a change to business logic
  - Not good for asynchrony because you cannot "fire and forget"
- Another approach is SOAP/JMS
  - Can be complex

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# WS ReliableMessaging Aims

- To help ensure that messages are delivered to their destination
  - Exactly Once In Order is the most common requirement
- "Composable" with other specifications and existing systems

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# The core model

- CreateSequence and CreateSequenceResponse
- Messages allocated to the sequence
- Acknowledgement
- Resend of unacknowledged messages
- TerminateSequence and TerminateSequenceResponse

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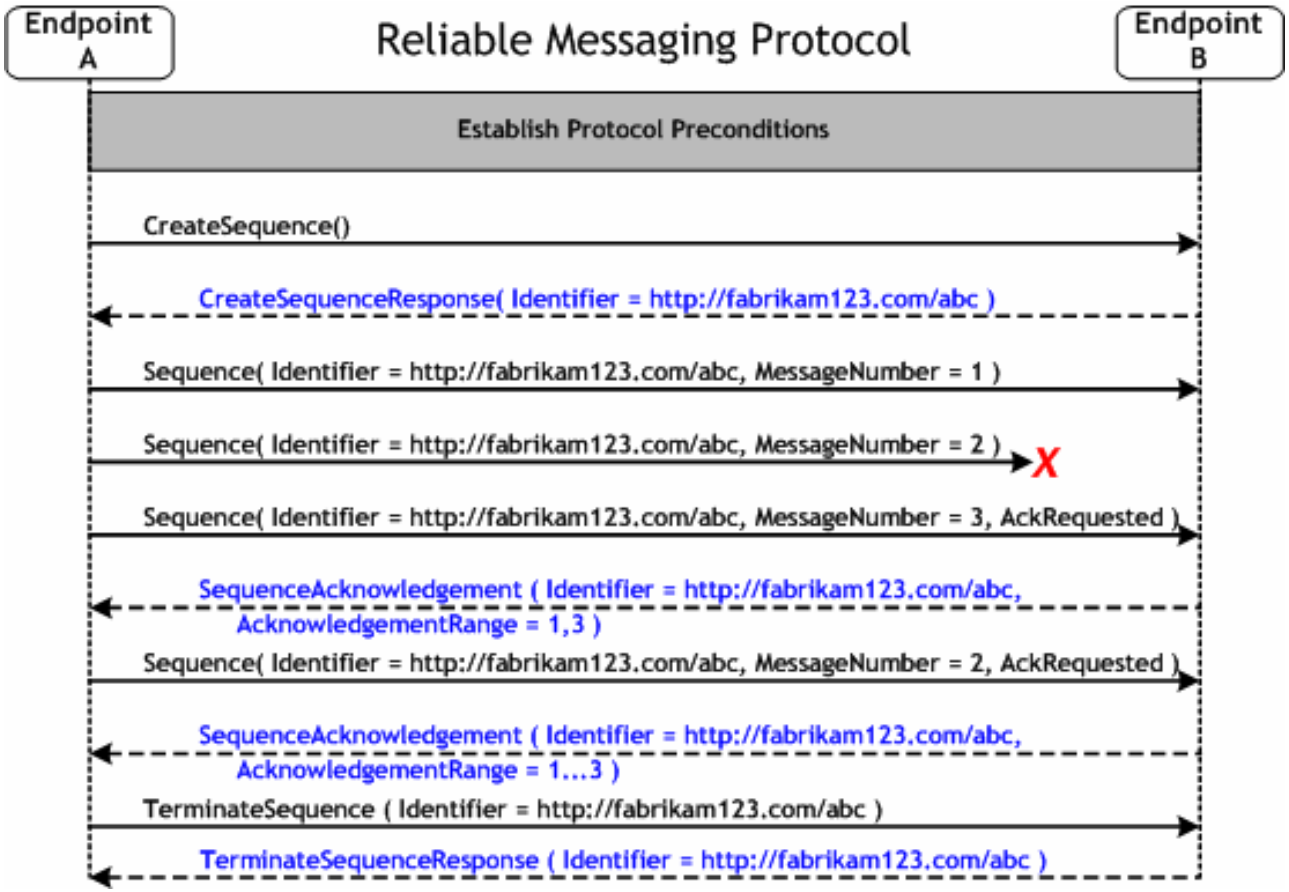
# Simple example



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# Issues with WSRM

- WSRM is just a wire protocol
- You need to ensure that your implementation offers persistence
- Overhead for short sequences
  - CS/CSR, TS/TSR

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# Transactions





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# WS Transactions

Atomic Transactions

Business Activity

Co-ordination

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# WS Transactions

- WS Co-ordination
  - Manages the overall interaction between parties
  - A voting protocol
- WS Atomic Transactions
  - Short-lived, ACID
- WS Business Activity
  - Longer running business transactions

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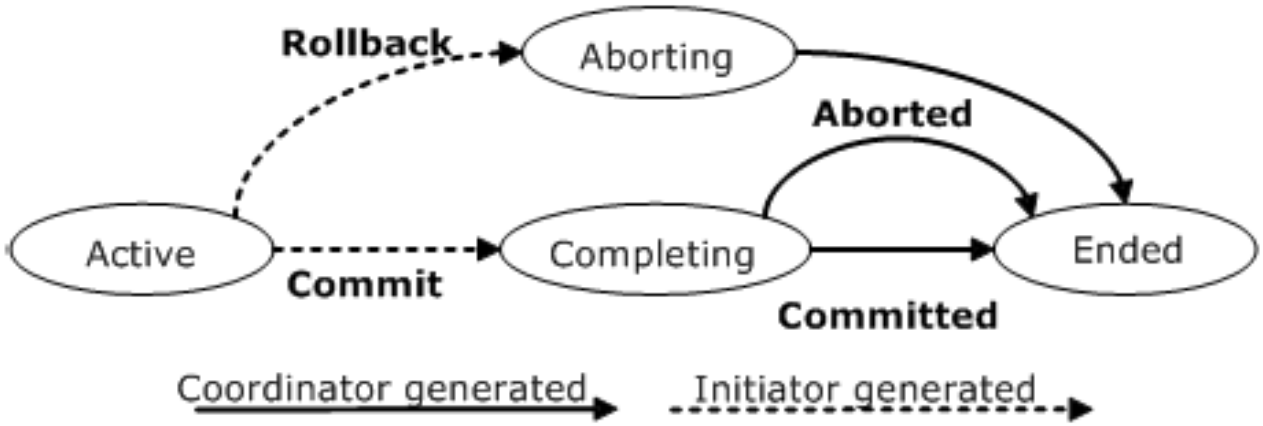
# WS Atomic Transactions




*How well does this fit into an SOA?*

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# Atomic Transactions

- Each row (or other resource) is locked until the transaction completes
  - Some databases lock a record which may contain more than one row
- The lock depends on the other parties involved
- Do you really want someone outside your organization holding locks on your database?
- Typically 2PC is used in very controlled circumstances:
  - E.g. between a queue and a database

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# Business Activity

- Based on a compensation model
- All activities proceed as normal
  - Within the scope of a long-running transaction
- If a fault is detected that requires the transaction to fail
  - Each party *compensates* for the work done

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# Issues with Business Activity

- Firstly, this is still early days for this spec and approach
- Secondly, each service has to offer the compensating operations
  - Requires planning
  - Needs to be built into the business analysis and design

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# Summary

- The ability to support:
  - Reliability
  - Security
  - Transactions

  Is key to an Enterprise quality SOA infrastructure
- But understanding the issues is also vital

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# Resources

- OASIS
  - WS-RX
    - http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=ws-rx
  - WS-TX
    - http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=ws-tx
  - WS-SX
    - http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=ws-sx